IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Zhong Dong et al		
Assignee:	ProMOS Tech. Inc.		
Title:	METHOD OF FORMING ONO-TYPE SIDEWALL WITH REDUCED BIRD'S BEAK		
Serial No.:	10/821,100	Filing Date:	April 7, 2004
Examiner:	Vu David	Group Art Unit:	2818
Docket No.:	M-15295 US	Confirmation No.:	8965

San Jose, California
December 14, 2007

MAIL STOP Board of Appeals
COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF (ONCE REVISED)

Dear Sir:

A Notice of Appeal was filed 9/14/07.

A Pre-Appeal Conference Brief was simultaneously filed in response to the Final Office Action of July 13, 2007. The Pre-Appeal Conference Decision of 10/24/07 provided Applicant with a one month extension to file the present Appeal Brief.

A first Appeal Brief was filed 11/15/2007 with authorization to charge the Appeal Brief fee required pursuant to 37 CFR §41.20(b)(2) to the below identified Deposit Account. Applicant received a noncompliance notice signed only by a group clerk (not by an examiner). This once-revised brief seeks to pass through the format requirements of the group clerk as related to Applicant's representative by SPE Steven Loke on 12/12/2007 in a telephone interview with same.

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(i) Identification of Real Party in Interest

The real party in interest is the Assignee of record: PROMOS TECHNOLOGIES INC. of HSING-CHU, TAIWAN (Reel/Frame: 015604/0267).

(ii) Related appeals and interferences

There are no other prior and/or pending appeals, interferences or judicial proceedings known to appellant, the appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(iii) Status of Claims

Claims 1-15 and 21-28 are pending in the subject application.

Claims 1-15, 21-23, and 24 were rejected under 35 USC §**103**(a) (as applied through §102(e)) as being obvious over **You** (US 6,706,613) in combination with **Wang** (US Pub 2005/0110102 published 5/26/05 on basis of an application filed 11/25/03). Reference was also made to **Fujimoto** (US 6,830,973) and to **Xing** (2003/0124873) as part of the justification for rejection.

Claims 11, 26 and 27 were rejected under 35 USC §**112** as lacking written description support. (No art was applied against claims 26-27.)

Claims 25 and 28 were indicated to contain allowable subject matter.

Claims 16-20 had been canceled.

All rejections are being appealed here, namely those pending against claims 1-15, 21-24, and 26-27 .

(iv) Status of Amendments

No amendment was filed subsequent to the final rejection of 7/13/2007. However arguments in response to the final rejections were filed 8/14/2007 and 9/14/2007 (the latter being the Pre-Appeal Conference Brief).

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(v) Summary of Claimed Subject Matter (including reference to support in the filed application)

Independent **Claim 1** is directed to a method of forming sidewall dielectric [*350 of Fig. 3C, spec pg.24, ¶0060*] on an ONO-type memory cell stack [*110 of Fig. 1A, spec pg.9, ¶0035*] where at least one sidewall of the ONO-type memory cell stack includes at least three "exposed" [*Last sentence of ¶0035*] material layers [*112-115 of Fig. 1A, spec pg.13, ¶0042*] with at least two of the exposed material layers being respectively composed of an oxide [*114*] and an oxidizable material [*112*] disposed adjacent to the oxide, and where the method comprises: (a) subjecting the at least one sidewall to a "dry" ISSG process (In-Situ Steam Generation) where the "dry" ISSG [*320 of Fig. 3A, spec pgs.19-21, ¶0054-56*] process comprises: (a.1) flowing [*See pg.12, ¶0041 where "flow" of DCS is defined*] molecular oxygen (O2) towards the stack; and (a.2) flowing molecular hydrogen (H2) towards the stack, where the volumetric flow ratio of the H2 to the O2 is less than about 0.2 [*See last sentence of ¶0040 where "unstable" is defined and pg.20, ¶0054*].

Independent **Claim 23** is directed to a method of forming sidewall dielectric on an ONO-type memory cell stack where at least one sidewall of the ONO-type memory cell stack includes at least three exposed material layers with at least two of the exposed material layers being respectively composed of an oxide and an oxidizable material disposed adjacent to the oxide, and where the method comprises: (a) subjecting the at least three exposed material layers of the sidewall of the ONO-type memory cell stack to a dry ISSG process (In-Situ Steam Generation) where the dry ISSG process generates short lived oxygen radicals [*See pg.22, ¶0058 and 327a,b in Fig. 3A*] whose reactivity extinguishes before the short lived oxygen radicals are able to permeate laterally [*Pg.22, ¶0058 and see also 129a,b in Fig. 1B*] as deep into said exposed oxide material of the ONO-type memory cell stack and oxidize materials therein as would the reactive oxygen of a dichlorosilane-based High Temperature Oxidation (HTO) process [*Fig. 1B*] applied to an essentially same ONO-type memory cell stack [*110' in Fig. 1B*] .

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(vi) Grounds of Rejection to be Reviewed on Appeal

The general grounds of rejection to be reviewed by the Board of Appeals are as follows:

(a) Whether each and every one of Claims 1-15, 21-23, and 24 was lawfully and properly rejected under 35 USC §103 as being obvious in view of You (US 6,706,613) and Wang (US Pub 2005/0110102.

(b) Whether each and every one of Claims 11, 26 and 27 was lawfully and properly rejected under 35 USC §112 as lacking written description support.

In seeking review for lawful and proper basis rejection, Applicant asks the Board to among other things, determine if the examination of record, including that covered by the Advisory Action of 8/24/2007 followed appropriate due process and law by considering all evidence and argumentation of record and by providing Applicant with proper notice pursuant to 35 USC §132 of the reasons for rejection including reasons for why rebuttal evidence and/or arguments did not overcome the maintained grounds of rejection and including reasons for why the preponderance of evidence supports the examiner's conclusion as to obviousness and lack of written description support. Of course Applicant asks the Board to reverse each of the above rejections based on the totality of the administrative record before it.

Detailed Bases of Rejection to be Reviewed on Appeal

In reviewing the above general grounds of rejection, Applicant asks the Board to consider the following detailed bases that underlie the rejections in terms of findings of fact made by the examiner and in terms of reasons articulated by the examiner for maintaining the rejections through the Advisory Action of 8/24/2007 despite rebuttal evidence and argumentation submitted by Applicant prior to Appeal.

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6.1: (Finding of Fact): The final rejection of 7/13/2007 (hereafter also "FOA") at pg. 4, ¶2 alleges that You 613' teaches to directly oxidize the "*exposed*" material layers of You's ONO stack (Fig. 2B) with a thermal oxide process. An additional finding buried within this ground of rejection is that the ordinary artisan would reasonably see You's silicon nitride

layer 106a as being an "*oxidizable*" part of the ONO-type structure (in the framework of solving the problem of reducing Bird's Beak). Applicant asks the Board to reverse the outstanding rejections as being based on improper claim construction, improper reading of the applied You 613' reference and improper consideration of the rebuttal evidence of record.

6.2: (Finding of Fact): The final rejection of 7/13/2007 (FOA) at pgs. 7-8, ¶6 alleges that You 613' teaches "*dry oxidation*" (meaning, no hydrogen) merely as an example or one possible choice and that the person of ordinary skill would not see any element of You '613 as being critical or essential unless You had expressly said so. Therefore the FOA concludes that an ISSG process is obviously substitutable into the environment of You '613 for achieving more "*excellent thickness*" results and for improving on "*thermal budget*" (FOA pg. 5, line 1). The FOA (Final Office Action of 7/13/2007) references the Abstract of Wang for supporting its allegation regarding "excellent thickness". Applicant asks the Board to reverse the outstanding rejections as being based on improper reading of the applied You 613' reference, improper reading of the applied Wang '102 reference, improper combining of away-teaching references and improper consideration of the rebuttal evidence of record.

6.3: (Review of Evidence): The FOA at pg. 8, end of ¶6 rules that Applicant's submitted Rule 132 Declaration (of Nov. 2006) "*merely states an opinion*" regarding what the ordinary artisan "would avoid" and that the Rule 132 Declaration "*reads too much*" into what the "dry oxidation" language of You '613 means to one of ordinary skill. The FOA at page 8, end of ¶6 then dismisses all the rest of Applicant's rebuttal evidence and rebuttal arguments by concluding: "*In all, the arguments are not persuasive*". Applicant asks the Board to reverse the outstanding rejections as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

6.4: (Finding of Fact): The FOA at pg. 4, ¶2 alleges as fact that the only thing You 613' fails to teach beyond the taught direct oxidizing of the allegedly "*exposed*" material layers of You's ONO stack (Fig. 2B) with a thermal oxide process is the use of a specific "*dry*" ISSG process in place of You's oxygen-only oxidation process. The FOA concludes as a matter of fact that Wang '102 teaches to the ordinary artisan to try a wide range of ISSG processes for forming a sidewall, not only for the non-ONO structure of Wang Fig. 4E where lateral permeation of oxygen is not an issue, but also as an obvious variation for the ONO stack structure (120) of You Fig. 2A (where the latter contains a problematic metal-silicide

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layer 112 discussed below) under the rational that Wang teaches that its full range of mentioned ISSG processes always **"provides excellent thickness control and the thermal budget can be reduced"** irrespective of the specific structure being oxidized. (See also FOA pg. 7, end of ¶5 where the Office action asserts that this stated basis for combining references is unrebutted "*common knowledge*" and therefore proper motivation.) Applicant asks the Board to reverse the outstanding rejections as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

6.5: (Review of Evidence): The FOA of 7/13/07 does not address at least the following points of rebuttal evidence raised by the Rule 132 Declaration of record: **(a)** the ordinary artisan would understand that You's ONO stack layers are not "*exposed*" at the time of oxidation (Rule 132 ¶4k); **(b)** the ordinary artisan would be motivated to not use hydrogen in the presence of You's exposed metal silicide layer (Rule 132 ¶4m) and therefore the ordinary artisan would be guided away from combining You with Wang because You teaches away by calling for "*dry oxidation*" (Rule 132 ¶4d); **(c)** under the common sense of, if-it-isn't-broken, then-don't-fix-it, the ordinary artisan would resort to industry standard processes (HTO, dry oxidation) for forming sidewall because they are well understood in the industry. The ordinary artisan would not instead engage in expensive and undue new experimentations with exotic ISSG formulations (Rule 132 ¶4i); **(d)** the ordinary artisan would not see the rational of the FOA regarding "*reduced thermal budget*" because the dry ISSG process of the claims does not reliably produce a stable exothermic hydrogen flame at the sidewall surface (Rule 132 ¶4e); and **(e)** each prong of the two prong motivation supporting the §103 rejection ("provides *excellent thickness control* and the *thermal budget* can be reduced") is rebutted by the Rule 132 Declaration as being factually incorrect and thus the allegation in the FOA that the stated motivation is unrebutted "*common knowledge*" is itself factually incorrect. Applicant asks the Board to reverse the outstanding rejections as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

6.6: (Review of Arguments): The post-final Advisory Action of 8/24/2007 does not address any of Applicant's post-final arguments as filed prior to Appeal, including that common sense would motivate the ordinary artisan to use the tried and proven, existing solutions for Bird's Beak, including You 613's approach of forming a protective nitride film coating and only thereafter using "dry" oxidation on the protectively coated sidewalls rather

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than trying something radically new and heretofore unproven as to effectiveness. Applicant asks the Board to reverse the outstanding rejections as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

6.7: (Review of Arguments): Rejections for lack of adequate written description remain of record against Claims 11, 26, 27 (see FOA at pgs. 2-3, ¶1). The post-final Advisory Action of 8/24/2007 does not address any of Applicant's arguments filed prior to Appeal regarding the §112 rejections, and thus Applicant is unsure of what the Examiner's current position is regarding Claims 11, 26 and 27. Applicant asks the Board to reverse the outstanding rejections as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

6.8: (Miscellaneous): With regard to Claim 12, the FOA asserts contrary to 35 USC §100(a) that "discovery" (of optimal results) is not patentable. With regard to Claims 13-14, the FOA asserts that there is a specific ISSG process taught by You and Wang that inherently produces the claimed results. With regard to others of the dependent claims there have been no showings of the recited limitations as is detailed below. Applicant asks the Board to reverse the outstanding rejections as being based on improper interpretation of the law with regard to patentability of discoveries and as being based on improper consideration of the totality of rebuttal evidence and argumentation of record.

(vii) Arguments

(The contentions of appellant with respect to *each* ground of rejection presented for review in paragraph (c)(1)(vi))

(a) With regard to whether each and every one of Claims 1-15, 21-23, and 24 was lawfully and properly rejected under 35 USC §103 as being obvious in view of You (US 6,706,613) and Wang (US Pub 2005/0110102, Applicant respectfully submits the following arguments under subsections 7.1-7.4:

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7.1 Agreement and Parting of Ways

Appellant and Examiner both agree that You '613 teaches a method for reducing Bird's Beak formation in an ONO stack where the Bird's Beak results from permeation of oxidizing agents.

You col. 2, lines 27-31 teach: "However, the oxidizing agents may permeate from the ~~upper portion~~ [sidewall lower edge] of the [poly & silicide] control gate 25 to[ward] the central portion B of the ONO layer 16 [of Fig. 1] so that **a bird's beak A** may occur as shown in FIG. 1".

> --Emphasis added. Strikeout and bracketed text added to fix an obvious translation error and to clarify that element 25 is comprised of poly layer 18 plus silicide layer 20. The oxidizing agents permeate inwardly towards the central vertical axis of the ONO stack. You's region A includes a lower edge portion of gate 25 (of poly 18) that has been consumed by oxidation and an upper edge portion of poly gate 14 that has been consumed by oxidation.

Appellant and Examiner part ways on the directions along which You '613 and Wang '102 send the ordinary artisan.

Appellant submitted a Rule 132 Declaration in November 2006 concomitant with the filing of a first RCE after the first Final Office Action of 06/06/2006. This appeal is taken from the second FOA of 7/13/2007 wherein the Rule 132 Declaration is summarily dismissed as being mere opinion.

The Rule 132 Declaration supports many of Appellant's below contentions. Established case law requires the PTO to demonstrate full consideration of all rebuttal evidence. However, to date, the PTO has failed to address all points raised in the Rule 132 Declaration. This is contrary to law. See In re Kumar 76 USPQ.2d 1048 (Fed. Cir. 2005) {"The *prima facie* case is a procedural tool, and requires that the examiner initially produce evidence sufficient to support a ruling of obviousness; thereafter the burden shifts to the applicant to come forward with evidence or argument in rebuttal. Piasecki, 745 F.2d at 1475. **When rebuttal evidence is provided, the *prima facie* case dissolves, and the decision is made on the entirety of the evidence.** Oetiker, 977 F.2d at 1445; In re Spada, 911 F.2d 705, 708 (Fed. Cir. 1990); In re Rinehart, 531 F.2d 1048, 1052 (CCPA 1976). "} [Bolding added.] See also In re Alton 37 U.S.P.Q.2d 1578, 1582-1584 (Fed. Cir. 1996) {"[The] Examiner's

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final rejection ... contained **two errors: (1)** ... and **(2) the summary dismissal of the [expert's] declaration**, without an adequate explanation of why the declaration failed to rebut the [rejection]"}.

Moreover, there is no way to determine what "subject matter as a whole *would have* been obvious *at the time the invention* was made to a *person having ordinary skill in the art*" (35 USC §103) except by qualified opinion of a knowledgeable declarant regarding how the PHOSITA of §103 "would have" behaved because the PHOSITA of §103 exists only in the past as a legally hypothesized person. See for example, In re Sullivan, 84 USPQ.2d 1034, (Fed. Cir. August 29, 2007) {"The Board [committed legal error in that it] failed to consider each of these [three] declarations. ... [T]he Board **must** give the declarations *meaningful* consideration before arriving at its conclusion. Moreover, the Board was mistaken to assert that the declarations only relate to the use of the claimed composition. The declarations do more than that; they purport to show ... how the prior art taught away from the composition, and how a long-felt need existed for a new antivenom composition. ... [T]he claimed composition was not known, and whether it would have been obvious [to PHOSITA] depends upon consideration of the rebuttal evidence. Had the Board considered or reviewed the declarations in any meaningful way, it might have arrived at a different conclusion than it did." [Bracketed text and emphasis added. Ellipses indicated skipped text.]}.

It is Appellant's contention that the PTO has failed thus far to give the filed Rule 132 Declaration meaningful consideration and to provide reasons pursuant to 35 USC §132 as to why the grounds of rejection are not overcome.

It is Appellant's contention that You '613 directs the ordinary artisan to always coat the sidewalls of an ONO stack with a silicon nitride film (one having strong Si-N bonds) prior to formation of sidewall oxide so that lateral permeation of oxygen into the stack via lateral oxide pathways will be retarded by the silicon nitride skin. **This teaching guides away from the claimed invention.** You '613 pre-conditions the sidewall of "all" embodiments with nitrogen (see You col. 3, line 10). The Rule 132 Declaration of record supports this contention.

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It is Appellant's contention that You '613 directs the ordinary artisan to only use a "dry" oxidation, which in the context of You means no hydrogen, and that this teaches away from combining with the hydrogen-based processes such as that of Wang '102. The Rule 132 Declaration of record supports this contention.

Appellant and Examiner both agree that Wang '102 teaches a method for reducing an oxidation thickness difference observed when conventional "*wet oxidation*" is applied to an open silicon surface and an adjacent nitride region (432 and 426 in Fig. 4E of Wang, see also 232 and 226 of Fig. 2E).

Wang pg. 1, paragraph [0005] states: "However, the oxidation selectivity of wet oxidation for the substrate and the silicon nitride layer is relatively high, that is, the oxidation rate of *wet oxidation* for the substrate is far greater than that of the silicon nitride layer." [Emphasis added.]

Wang does not compare his ISSG processes against "dry" oxidation, only against "wet" oxidation. The purpose of Wang, as stated in his Abstract, is to "significantly reduce[ ] the processing time" for oxidizing the exposed "upper surface and the sidewalls of the silicon nitride layer" (426). This is done by maximizing the concentration of generated oxygen radicals. According to Wang paragraph [0032]: "The oxygen radical **peak** *concentration* results from a balance of radical generation through molecular collisions that are strong functions of temperature and pressure, and recombination processes ... the ISSG process depends upon using process pressure, flow rate and temperature in the chamber within specified ranges. Accordingly, in some embodiments the following parameters can be effective" [emphasis added].

It is Appellant's contention that the word "*some*" in the above last line means not all. The Rule 132 Declaration of record supports this contention. The Rule 132 Declaration of record supports this contention. (See Rule 132 ¶5d.)

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It is Appellant's contention that the phrase "*within specified ranges*" means those that result in an "oxygen radical peak concentration" because that is the way that Wang minimizes time for oxidation. He generates as many oxygen radicals as possible for thereby maximizing reaction rates and minimizing time needed for oxidation to a desired thickness. Wang does not teach or remotely suggest the concept of *shortening* oxygen radical lifetimes by supplying a flow of hydrogen that is insufficient to sustain a stable hydrogen flame. The thrust of Wang's teachings are to maximize rather than shorten the lifetimes of ISSG-generated oxygen radicals. This is done so that, per Wang paragraph [0006], "Then the [peaked concentration of] reactive oxygen radical can effectively oxidize the silicon or silicon nitride on the substrate" [bracketed text added]. Note Rule 132 ¶5d where it is explained that Xing '873 guides artisans to lengthen radical lifetimes.

It is Appellant's contention that the FOA uses Applicant's disclosure as a blueprint for picking and choosing by hindsight (e.g., by ignoring Wang's main thrust regarding the maximizing of oxygen radical concentration) only that which supports a preordained conclusion of obviousness. See ¶5h of the Rule 132 Declaration which states: "It seems to me that the Patent Office is copying the idea of using dry ISSG for Birds' Beak out of the subject patent application and then projecting it by way of hindsight into Wang '102 at the portion of OA page 3 where they mention Xing '873 as evidence of the state of the art." [Emphasis added.]

Appellant and Examiner both agree that Wang '102 recites a wide range of ISSG process parameters: "[0018] In some embodiments ... the H_2 and O_2 are introduced at flow rates proportionately in a range (H_2/H_2+O_2) about 0.1% to about 40%, **more usually** in a range about 5% to about 33% (H_2/H_2+O_2), and in particular embodiments at flow rates proportionately about 1:19 or 1:3 or 1:2 ..." [Emphasis added.]

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Appellant and Examiner part ways however on the understandings that the ordinary artisan would draw from this text (e.g., the "**more usually**" language); particularly as it regards the unusual, relatively "dry" low end of the broad range in the "about 0.1% to" about 5% range. (It should be noted that the ratio expressed as (H_2/H_2+O_2) is not the same as the

ratio expressed as (H_2/O_2). For example when quantities of H_2 and O_2 are equal, the first ratio equals 1/2 while the second ratio equals 1/1. The You reference speaks in terms of the first ratio while Appellant's claims speaks in terms of the second ratio. Appellant does not agree with the voodoo math used by the FOA at page 4 thereof. The Rule 132 Declaration at end of paragraph 5L explains that the correct conversion is that an H_2/O_2 ratio of x becomes an $H_2/(O_2 + H_2)$ ratio of $x/(1+x)$ so that, as x approaches unity, the value of $x/(1+x)$ approaches 50%.)

The Examiner, if understood correctly, appears to have made a finding of fact that the ordinary artisan would see Wang as teaching that ISSG always provides "*excellent thickness control*" (which phrase, by the way, is not in Wang's disclosure) and "*reduced thermal budget*" no matter what value of (H_2/H_2+O_2) is used in the broadly recited outer range (about 0.1% to about 40%) and no matter what the details are of the structure being subjected to any specific ISSG within this broad range.

By contrast, it is Appellant's contention that the ordinary artisan would treat the unusual and relatively "dry" low end of the broad ISSG range recited in the patent publication document with great skepticism and as being problematic because it cannot support a stable hydrogen flame and it therefore does not maximize concentration of oxygen radicals per Wang's teachings. Moreover, an unstable flame fails to reduce thermal budget because thermal budget is instead reduced by stable ISSG wherein the exothermic heat of a lit and maintained hydrogen flame provides a localized temperature boost to the surface at which the stable flame is present. See ¶4e of the Rule 132 Declaration ("... the hydrogen flame provides localized exothermic heat, and without the flame, a non-local source of heat will probably have to be used (i.e., Rapid Thermal Heating lamps) and this will tend to hurt rather than help the thermal budget of the overall chip. ... As I already explained above, ISSG cannot be arbitrarily used in every arbitrary situation. If a metal silicide is present for example, the ordinary artisan should be highly motivated to not use an oxidation process that exposes the silicide to hydrogen. The ONO stack structure of You '613 constitutes such a situation. Thus, the ordinary artisan would have no motivation for combining You '613 and Wang '102." [emphasis added]).

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It is Appellant's further contention that the ordinary artisan would not see Wang '102 as suggesting that lateral permeation of oxygen through oxide pathways of an ONO stack can be reduced by specifically using the relatively "dry" end of the broadly recited ISSG range.

Comparison of Wang Figs. 2E and 4E shows that Wang teaches in 4E to not have a completed ONO stack at the time ISSG is performed. Fig. 2E has an oxide covered nitride layer 226 while Fig. 4E teaches that the nitride layer 426 should have its upper surface open at the time ISSG is applied. Then in Fig. 4F ones sees the result, including the large oxide bulge 434 formed over silicon area 432.

It is Appellant's further contention that the ordinary artisan would see **Wang as teaching that ISSG produces significant Bird's Beak because Fig. 6 of Wang explicitly shows a large Bird's Beak structure (634)** being formed as a result of ISSG. This structure 634 corresponds to bulge 434 of Fig. 4F. See ¶5h of the Rule 132 Declaration ("... Bulging oxide growth 434 indicates volume enlargement as silicon implant region 432 and substrate are thermally oxidized. Wang provides no suggestion that a relatively dry ISSG might reduce lateral advancement of an oxidation front due to reduced lifespan of oxygen radicals ..." [emphasis added]).

The FOA of 7/13/2007 asks the reviewers to erase from their sight the **large Bird's Beak structure (634)** that is shown to be formed as a result of ISSG in accordance with Wang.

The FOA of 7/13/2007 asks the reviewers to pretend that the ordinary artisan would not see the bulging Bird's Beak structure 634 of Fig. 6 or the bulging oxide counterpart 434 in Wang Fig. 4F.

This is a picking and choosing is the hallmark of hindsight and is contrary to law. The ordinary artisan (PHOSITA of §103) would have seen the bulges and would have concluded from these that Wang's ISSG processes are not useful for reducing Bird's Beak and would have been guided away from combining Wang with You at least for this reason if not also for the facts that You teaches a completely different mechanism based on a nitride barrier and You calls for a metal silicide layer 20 within his composite control gate 25 (of Fig. 1, see also 111 and 109 of Fig. 2A).

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7.2 Errors in construction of Claims 1, 23 and/or Erroneous Findings of Facts

Proper rejection is predicated on proper claim construction and on proper reading of the prior art.

Claims 1 and 23 contain the word "exposed". At this juncture it is unclear to Appellant/Applicant whether the outstanding grounds of rejection (FOA of 7/13/2007) interpret the word "exposed" to mean not-exposed or whether the outstanding grounds of rejection interpret You col. 6, lines 25-37 as not calling for the singular "a film containing nitride" that coats the stack sidewall 120a prior to oxidation. As such, Appellant/Applicant contingently assumes each in the alternative and argues that either the word "exposed", as it appears in Claims 1 and 23 is not being properly construed or that the nitride containing single coating film of You '613 is not being properly accounted for.

Regrettably, the outstanding grounds of rejection do not address You col. 6, lines 25-37 where You explicitly teaches that the sidewall 120a of ONO stack 120 (Fig. 2B) is not exposed, but that it is instead covered with **"a film containing nitride"** and that this nitride containing coating resists breakdown "so that oxidizing agents do not appear to penetrate [through the coating and] into the central portion of the ONO layer 108." [Bracketed text added.]

The Rule 132 Declaration of Nov. 2006 does address You col. 6, lines 25-37 and finds at ¶4k thereof that:

> [I]t would have been very clear to an artisan of ordinary skill that You '613 teaches at col. 6, lines 8-37 to use silicon nitride as a thin diffusion barrier on the sidewall of an ONO stack for precisely this purpose; for slowing down lateral permeation of oxygen into the interior of the stack during thermal oxidation of the sidewalls of his FG/ONO/CG stack 120 of Fig. 2B. You '613 implicitly teaches at col. 6, lines 36-37 that, were it not for the S-N (*sic*) bonds formed in his nitrogen pre-anneal step of col. 6, lines 8-25, that "oxidizing agents" would have "penetrate[d] into the central portion of the ONO layer 108 [in other words, deep into region "A" of You Fig. 1, reaching as far as the outer boundary of region "B"]" [*Bracketed text added*]. You '613 unequivocally teaches at col. 6, lines 29-35 that a film containing strong silicon-nitrogen bonds (S-N bonds) (*sic*) should be formed on the sidewall 102a of stack 120 before the stack is subjected to the thermal oxidation (to the "dry oxidation" of col. 6, lines 38-40). The pre-oxidation anneal in the nitrogen containing

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atmosphere causes the sidewalls in You's stacked gate structure 120 to be covered and protected by a thin nitride film such that they are not directly exposed to the thermal oxidation environment. In other words, You's stacked gate structure 120 does not have openly exposed oxide to serve as a gateway through which oxygen can readily enter laterally into the interior of the ONO structure to thereby quickly begin the process of Bird's Beak intrusion. You's ONO structure is covered on its sidewall with nitride before thermal "dry oxidation" is initiated at col. 6, lines 38-40. This aspect of You '613 is not ambiguous or open to reasonable debate. Instead, it is the whole basis of the invention described by You '613. You uses the thin nitride coating to slow down entry of laterally permeating oxygen into the regions between his FG and CG layers, and to thereby reduce the Bird's Beak incursion as is shown in region "C" of You Fig. 2C.

When placed on opposed sides of a scale that measures preponderance of evidence, the silence by the outstanding FOA regarding You col. 6, lines 25-37 is outweighed by the Rule 132 Declaration irrespective of how little credibility is attributed to the Rule 132 Declarant because something always outweighs nothingness. (Additionally, the PTO has produced no showing to challenge the credibility of the Rule 132 Declarant.)

In contrast to the nitride coated ONO stack of You '613 (as established at least by the above quoted portion of ¶4k of the Rule 132 Declaration), the preamble of rejected Claim 1 calls for "an ONO-type memory cell stack where at least one sidewall of the ONO-type memory cell stack includes at least three exposed material layers with at least two of the exposed material layers being respectively composed of an oxide and an oxidizable material disposed adjacent to the oxide" [emphasis added].

The body of Claim 1 makes antecedent reference to the preamble (to "the at least one sidewall"). The final rejection of 7/13/2007 (FOA) at pg. 4, ¶2 does not dispute that the preamble is due patentable weight and instead apparently finds either as claim construction that exposed means not exposed; or finds as fact that You 613' teaches to directly oxidize the allegedly "exposed" material layers of You's ONO stack (Fig. 2B) with a thermal oxide process ("for example a dry oxidation" per col. 6, line 39 of You). Interestingly, as part of this ground of rejection against Claim 1, the FOA goes out of its way to find that You's silicon nitride layer 106a is the primary equivalent to the "oxidizable material disposed adjacent to the oxide" as recited in Claim 1. The pre-RCE first FOA of 06/06/2006 did not identify an equivalent in You for the "oxidizable material".

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7.3 Selective Picking and Choosing

An essential part of the §103 rejections against Claims 1 and 23 is the allegation (at FOA pg. 5, line 1) that the person of ordinary skill would view Wang's ISSG processes as always providing "**excellent thickness control and the thermal budget can be reduced**". Appellant demonstrates herein that each prong of this two-pronged basis is without basis.

With regard to the alleged "*excellent thickness control*" aspect, it is to be observed that Wang does not compare ISSG against dry oxidation with O_2 but rather against "wet oxidation". (See again Wang pg. 1, paragraph [0005] as partially reproduced above.) Moreover, Wang never uses the phrase, "*excellent thickness control*". That is something fabricated out of thin air by the FOA. Instead Wang states: "[0016] In some embodiments the ratio of the thicknesses of the resulting second silicon oxide layer and gate oxide layer is in the range about 0.6:1 to about 0.8:1." [Emphasis added.]

With regard to the alleged reduction of "*thermal budget*" aspect, it is to be again observed that Wang does not compare ISSG against dry oxidation with O_2 but rather against "wet oxidation". At paragraph [0003] Wang sates: "[I]n conventional processes[,] oxidation of silicon nitride is time-consuming and has a very high thermal budget. In some conventional processes, for example, silicon nitride is oxidized by wet oxidation within a furnace at a temperature of 1000°C over a time period as long as 60 minutes."

In view of the above, there is no factual basis for asserting that the ordinary artisan would view any of Wang's ISSG processes as promising a reasonable likelihood of either "*excellent thickness control*" as compared to dry oxidation with O_2 or reduction of "*thermal budget*" as compared to dry oxidation with O_2. Yet these are the only motivations by way of which the FOA justifies the combining of Wang with You. These are the only motivations by way of which the FOA justifies the replacement of You's dry oxidation with only O_2 (after a silicon nitride film has been grown) with an ISSG process cherry picked out of the extreme lower, dry end of Wang's broadly recited outer range "(about 0.1% to about 40%)". Incidentally, 40% in Wang's terms becomes 66.7% in terms of the (H2/O2) ratio. (Let 40% equal x/(1+x) and then solve for x.) Nowhere does either of You or Wang promise that an

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ISSG of any arbitrary parameter will always provide "*excellent thickness control*" or reduction of "*thermal budget*" in the context of You's nitride coated ONO stack.

What we have here is a long string of selective omissions and additions by the FOA in its stretched attempt to reach the preordained conclusion of obviousness. The FOA appears to conveniently strip off from the ONO stack, the essential nitride coat required by the teachings of You '613. The FOA appears to conveniently strip out from You '613 the presence of the metal silicide layer in the ONO stack. The FOA appears to conveniently strip out from Wang '102 the Bird's Beak features 634 that are so prominent in Fig. 6. The FOA appears to conveniently add into Wang a teaching that is simply not there, namely that an ISSG of any arbitrary parameter will always provide "*excellent thickness control*" and reduction of "*thermal budget*" in the context of You's ONO stack and relative to any other method of oxidation. (Wang compares his ISSG only against "wet" oxidation and only with respect to his non-ONO structure of Fig. 4E.).

It is well established that such serial pickings and choosings are impermissible. See for example, In re Hedges 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986) "[T]he prior art as a whole must be considered. The teachings are to be viewed as they would have been viewed by one of ordinary skill. ... It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art."

The person of ordinary skill as defined in 35 USC §103 cannot ignore Wang's oxide bulge 434 and its exposed predecessor 432 in Fig. 4E. It is to be kept in mind that You's stated goal is to avoid formation of such structural deformations (see You col. 2, lines 27-41) by first pre-conditioning "all" embodiments with nitrogen (see You col. 3, line 10). Wang by contrast has the open silicon region 432 in Fig. 4E. Thus You and Wang teach away from one another.

There is no evidence that Wang's ISSG processes would be effective in combination with You's stack where the latter contains a metal silicide (112 of You Fig. 2B, col. 5, line

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20). There is evidence to the contrary, namely, that presence of hydrogen will present a problem for the metal silicide layer.

The person of ordinary skill would readily recognize that there is no ONO stack in Wang Fig. 4E, let alone one comprising a metal silicide layer. The person of ordinary skill would readily recognize that bulge 434 of Wang's post-oxidation Fig. 4F corresponds to the Bird's Beak analog shown as 634 in Wang Fig. 6. Note that 632 of Fig. 6 corresponds to 432 of Fig. 4F; 627 of Fig. 6 (the fully encased nitride) corresponds to 427 of Fig. 4F (the fully encased nitride) and 638 of Fig. 6 corresponds to 4387 of Fig. 4G. Wang does not suggest that a specific dry form of ISSG should be tried for purpose of reducing Bird's Beak formation in an ONO stack and neither does You '613.

Appellant's position regarding Wang is supported by ¶5h of the Rule 132 Declaration which states: "Bulging oxide growth 434 indicates volume enlargement as silicon implant region 432 and substrate are thermally oxidized. Wang provides no suggestion that a relatively dry ISSG might reduce lateral advancement of an oxidation front due to reduced lifespan of oxygen radicals and that this may in turn provide a useful solution to the long known and not fully solved, Bird's Beak problem. It seems to me that the Patent Office is copying the idea of using dry ISSG for Birds' Beak out of the subject patent application and then projecting it by way of hindsight into Wang '102 at the portion of OA page 3 where they mention Xing '873 as evidence of the state of the art."

Appellant's position regarding the metal silicide layer (112) in You's stack is supported by ¶¶ 4c-4d of the Rule 132 Declaration which explain: "There is a very good reason for why You '613 insists on a "dry" oxidation. It is not a user-bypassable option. Hydrogen tends to act as a catalyst for encouraging decomposition of metal silicides." The Rule 132 Declaration concludes in this regard that: "because an ISSG atmosphere includes hydrogen, the ordinary artisan would see You '613 as teaching away from use of ISSG."

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With regard to You '613, it should remain undisputed that col. 6, lines 25-37 teach: "These bonds of Si--N do not appear to break during the successive oxidation process so that oxidizing agents do not appear to penetrate into the central portion of the ONO layer 108" [emphasis added]. In other words, the oxidation process happens, successively, only after the protective nitride barrier is formed.

The FOA of 7/13/2007 appears to disagree with Applicant's contention that the "successive oxidation process" takes place only after the singular, "a film containing nitrogen" has been first formed on the exposed ONO stack so as to thereby cause the sidewalls of You's ONO stack to all become unexposed. The FOA instead makes reference at pg. 4 ¶2 thereof to a post-anneal process described at You col. 7, lines 58-67 which leaves "a silicon oxynitride film ... formed at the outer surfaces of the oxide film 116 [Fig. 2C] ... as was already described." [Bracketed text and emphasis added.] It is not understood how this reference to the supplemental SiON film aids the Examiner's case. The relied on text does not negate the fact that You col. 7, lines 23-35 still directs the ordinary artisan to use a nitrogen pre-treatment "so that the growth of an oxide film is at least partially restrained" and they still teach that the pre-oxidation exposure to nitrogen is responsible for "the substrate 100 is not significantly exposed to oxygen during the steps of loading and heating the substrate 100, the growth of a significant bird's beak can be restrained at the lateral portion of the ONO layer 108 during a successive oxidation process." [Emphasis added.] This is just another way of saying that the protective nitride film is grown first and only afterwards, is the "successive" dry oxidation process pursued.

The issue in presenting a proper §103 rejection should not be one of picking and choosing convenient snippets of text from You '613, convenient snippets of text from Wang '102; but rather that of reading the whole of You for what it fairly teaches to one of ordinary skill without aid of hindsight and reading the whole of Wang for what it fairly teaches to one of ordinary skill without aid of hindsight.

To this end Applicant has submitted expert testimony regarding what the words and diagrams of You '613 would have meant to one of ordinary skill (to PHOSITA of §103) at the relevant time. At ¶4k of the Rule 132 Declaration, it is submitted that "[P]rior to the critical date, it would have been very clear to an artisan of ordinary skill that You '613 teaches at col. 6, lines 8-37 to use silicon nitride as a thin diffusion barrier on the sidewall of an ONO stack

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for precisely this purpose; for slowing down lateral permeation of oxygen into the interior of the stack during thermal oxidation of the sidewalls of his FG/ONO/CG stack 120 of Fig. 2B." Moreover it is found in the rebuttal testimony at the same ¶4k that "The pre-oxidation anneal in the nitrogen containing atmosphere causes the sidewalls in You's stacked gate structure 120 to be covered and protected by a thin nitride film such that they are **not directly exposed** to the thermal oxidation environment. In other words, You's stacked gate structure 120 does not have openly exposed oxide to serve as a gateway through which oxygen can readily enter laterally into the interior of the ONO structure to thereby quickly begin the process of Bird's Beak intrusion. You's ONO structure is covered on its sidewall with nitride before thermal "dry oxidation" is initiated at col. 6, lines 38-40. This aspect of You '613 is not ambiguous or open to reasonable debate. Instead, it is the whole basis of the invention described by You '613." [Emphasis added.]

7.4 Dependent Claims

With regard to Claim 3, the recited volumetric flow ratio of H2/O2 equal to, or less than, about 0.02 clearly falls below the usual 5% or more of Wang. additionally there is no showing that Wang defines parameters in terms of volumetric flow.

With regard to Claim 4 there is no showing of rapidly heating the flowing gases as they flow towards said at least one sidewall.

With regard to Claim 5, there is no showing of the recited duration of about 20 seconds to about 300 seconds.

With regard to Claim 6, there is no showing of varying the O2 flow rate.

With regard to Claim 7, there is no showing of varying the H2 flow rate.

With regard to Claim 8, there is no showing of the specific chamber pressure in combination with the recited ratio of Claim 3.

With regard to Claim 9, there is no showing of the at least three *exposed* material layers.

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With regard to Claim 11, there is no showing of the recited second silicon nitride layer. Additionally, Fig. 3A of the filed application does show an ONO stack that lacks a metal silicide layer.

With regard to Claim 12, there is no showing of the recited height variation ratio in combination with the limitations of Claim 3. In re Aller does not stand for the proposition that all discoveries are obvious. On the other hand, according to In re Ochiai, 37 USPQ.2d 1127 (Fed. Cir. 1995) "[S]ection 103 requires a fact-intensive comparison of the claimed process with the prior art rather than the mechanical application of one or another per se rule. See *Pleuddemann*, 910 F.2d at 827, 15 U.S.P.Q.2D at 1741").

With regard to Claim 13, there is no showing of the recited lateral sidewall breakdown voltages.

With regard to Claim 14, there is no showing of the recited larger erase speed relative to that obtained with a sidewall dielectric formed by a dichlorosilane-based HTO process.

With regard to Claim 15, there is no showing of the recited forming of a further and supplemental sidewall dielectric by a non-ISSG oxidation process after said dry ISSG process. You does not teach or suggest forming a sidewall by dry ISSG. Wang also does not teach or suggest forming the recited first sidewall by dry ISSG.

With regard to Claim 21, there is no showing of the recited setting of the O2 flow rate over the range of about 3slm to about 10slm.

With regard to Claim 22, there is no showing of the recited additional setting of the H2 flow rate over the range of about 0.1slm to about 1slm.

With regard to Claim 23, there is no showing of the recited short lived oxygen radicals. Xing directs the ordinary artisan to have long lived radicals. So does Wang for the purpose of achieving peak radical concentration. The ability of the FOA to appreciate the physics of the invention in hindsight does not make for a prima facie case. See for example, In re Fine, 837 F.2d 1071; 5 USPQ.2d 1596, (Fed Cir. 1988) {"To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of

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record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." W.L. Gore, 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made . . . to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." Id. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to depreciate the claimed invention."}. See also In re Kahn, 78 USPQ.2d 1329, (Fed. Cir. 2006), rehearing, en banc, denied (Fed. Cir., June 1, 2006) {"the Board reiterated that the rationale of [its earlier] decision was correct and explained that motivation "clearly is based upon a prospective look at the state of the art."" [emphasis added.]}

With regard to Claim 24, there is no showing of the recited consistent, predefined performance characteristics in the applied prior art.

With regard to Claim 26, there is no showing of the recited instability or extinguishment of the hydrogen flame in the applied prior art.

With regard to Claim 27, there is no showing of presence in the prior art of the recited instability of the hydrogen flame being assured on a mass production basis.

Response After Final to Examiner's Response to Arguments re "for example"

If understood correctly, the FOA appears to take the position with regard to the You '613 language: "for example a dry oxidation process" that a person of ordinary skill in the art would interpret this passage to mean, "I the ordinary artisan can use any of an infinite number of different oxidation processes as I please while the stated one-and-only example of "dry" oxidation is merely a nonbinding suggestion which I can readily choose to ignore," --to sort of paraphrase the thought process of the hypothetical artisan.

The FOA challenges Applicant's assertion with regard to the You '613 language: "for example a dry oxidation process" that a person of ordinary skill in the art would interpret this

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passage to mean that dry (no hydrogen) oxidation must be used. Applicant respectfully re-asserts that, yes, the person of ordinary skill in the art would interpret this passage to mean that dry (no hydrogen) oxidation must be used. This is backed up by evidence, by the submitted Rule 132 Declaration.

Interpretation of a prior art document is an issue of fact. Prior art documents must be interpreted through the eyes of a skilled artisan at the relevant time and not through the eyes of an unskilled layman. Al Site Corp v. VSI International 50 USPQ2d 1161 (fed, Cir. 1999) (In the first place, the level of skill in the art is a prism or lens through which a judge or jury views the prior art and the claimed invention. This reference point prevents these deciders from using their own insight or, worse yet, hindsight, to gauge obviousness.)

Of course, an untrained layperson may easily say to himself: "Oxidation is oxidation, what's the difference? One is like the next." But this is where the insight of the skilled artisan overshadows the simple mindedness of the unskilled layperson. Oxidation is not just another word. There all sorts of nuances and fine points to oxidation as has been made clear in the record of the present prosecution by way of the Rule 132 declaration and by way of attorney arguments.

The FOA appears to emphasize the phrase "for example" in You '613 from a purely linguistic view point, rather from the view point of the skilled artisan. The FOA appears to see many possibilities opened up to the ordinary artisan by You's silence; by the fact that You '613 does not come out and explicitly say, "Warning, do not use anything but dry oxidation." This denies the realities of the patent drafting process. Persons skilled in the art understand that patents are generally drafted by attorneys and not directly by the engineers/scientists. You '613 clearly shows on its front cover page that a law firm was involved in its prosecution. This is a fact. No reasonable attorney/law firm will readily allow their client to write in a patent application, "Warning, do not use anything but dry oxidation." They will almost always push the inventors/engineers/scientists to include hedge language such as, "for example". If indeed there were other viable alternatives to "dry" oxidation, You et al. could have easily provided at least one more example. But You didn't. And the reason is because, technically speaking, there was none. The Rule 132 Declaration of record provides undisputed evidence that the skilled artisan would not use anything other than dry, hydrogenless oxidation due to the presence of the metal silicide (111 Fig. 2a) in You's structure. The patent examination process

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should be one based on science, on the realities of real world chemistry, and not on playing word games and engaging in linguistic expansionism. It is respectfully submitted that the person of ordinary skill would assign different weights to different parts of a patent document based on the knowledge that some artisans are more credible, more precise with their language and more authoritative than others. The words "for example" would be heavily discounted in this particular instance. Patent attorneys are not scientists. There are untold numbers of issued patents in the semiconductor field where clearly the attorney who wrote the text did not know the difference for example, between "thermally growing" oxide and "depositing" oxide, although in most instances the two are not at all the same. The person of skill in the art generally knows when a portion of a patent is being filled in with attorney hedge language (often unintentional misinformation due to the attorney's technical ignorance) rather than with an artisan's knowledgeable provision of useful information. The "for example" in You's disclosure would be seen as mere puffery; as just smoke and mirrors put in there probably at the instance of a patent attorney who did not want the disclosure to appear to be too limiting. However, a person skilled in the art would understand that in the particular case of You '613, where metal silicide is taught as an important part of the ONO stack, the oxidation must be so limited. There is no other viable oxidation process disclosed. The only process disclosed and taught is "dry" oxidation. It is an act of hindsight to read into You '613 more than what is actually taught to the ordinary artisan.

A person skilled in the art would read You '613 as teaching away from use of anything but dry oxidation. This established in the Rule 132 of record.

Response After Final to Examiner's Response to Arguments re motivation to combine

Exactly one week after Applicant's response to final was filed (4/23/2007), the US Supreme Court handed down its KSR v. Teleflex decision (on 4/30/2007).

One thing that KSR did not do, is open the door for the PTO to ignore "away" teachings. It is still the law that when one of two references teaches away, the combination cannot be made. The Rule 132 of record establishes that You '613 would be seen by an ordinary artisan as teaching away from using anything but "dry" oxidation, in spite of insertion of the artful "for example" language in its text.

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Additionally, after KSR, a new class of "common sense" decisions have been handed down by the Board of Appeals. One of them indicates that in cases where the prior art already provides a solution for a known problem (i.e. Bird's Beak) the "common sense" of the ordinary artisan would tell him to use the known solution rather than to go hunting for untested alternate solutions. **In other words, per common sense, if it ain't broke, don't fix it.**

See explicitly: Ex parte Rinkevich, Appeal 2007-1317, Application 09/731,623, Decided: May 29, 2007 ("Nevertheless, in KSR the Supreme Court also qualified the issue of hindsight by stating that "[r]igid preventative rules that deny fact-finders recourse to common sense, however, are neither necessary under our case law nor consistent with it." KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 82 USPQ2d at 1397. In the instant case, we conclude that a person of ordinary skill in the art having common sense at the time of the invention would not have reasonably looked to Wu to solve *a problem already solved by Savill*." [*Emphasis added.*])

In the instant case, You '613 provides a solution, namely to nitridate the surfaces of the ONO sidewalls so that no sidewall layer remains exposed during the subsequent dry oxidation but rather so that the nitride protectively coats all the layers against rapid permeation of oxidizing agents into the center of the ONO stack. This aspect is also discussed in the Rule 132 of record and remains unrebutted. You '613 teaches away from having exposed surfaces. You provides a solution to Bird's Beak.

The outstanding Final Office Action (FOA) appears to take the position that Applicant has not rebutted the proffered motivation: "a dry ISSG provides *excellent thickness control* and the *thermal budget* can be reduced". This position, namely that Applicant has not contested the assertion, is not true. As shown above, Applicant has thoroughly rebutted each prong of the two prong allegation of a justifying motivation.

In view of the above, there is ample reason to reverse the rejection as being based on an improper motivation statement; one that has been rebutted by expert testimony. The declarant, Mr. Chen is hardly a lightweight in the field. He has a PhD degree in chemistry. He co-authored a number of professional papers in the field. He is a named co-inventor on a number of patents issued in the field. His declaration should not be summarily dismissed.

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With regard to summary dismissal of Rule 132 declarations, please see again In re Alton, 37 U.S.P.Q.2d 1578, 1582-1584 (Fed. Cir. 1996):

> [The] Examiner's final rejection ... contained **two errors: (1)** viewing the [expert's] declaration [respecting the adequate disclosure issue as being merely an] opinion ... addressing a question of law rather than [providing factual testimony pertaining to] a question of fact; **and (2) the summary dismissal of the [expert's] declaration**, without an adequate explanation of why the declaration failed to rebut the [rejection] ... [With regard to item (1), we read the expert's] declaration [as] offering factual evidence in an attempt to explain *why* one of ordinary skill in the art would have understood the specification to describe [adequately the subject matter at question] .... [With regard to item (2), as the burden of coming forward with arguments and evidence shifts back and forth from first being on the Examiner to present a prima facie case and then to the Applicant to rebut; **after such rebuttal] evidence or argument is submitted by the Applicant in response, patentability [must be] determined on the totality of the record**, by a preponderance of the evidence with due consideration to persuasiveness of argument. ... [In this case, **the Examiner committed error] by failing to articulate adequate reasons to rebut the [expert's] declaration** [which failure means that the PTO has] failed to consider the totality of the record ...

[Emphasis and bracketed text added. Some language skipped over for sake of brevity.]

7.5 Written Description Support

(b) With regard to whether each and every one of Claims 11, 26 and 27 was lawfully and properly rejected under 35 USC §112 as lacking written description support Applicant respectfully submits the following arguments.

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If understood correctly , the FOA appears to take the position with regard to method Claim 11 ("and further wherein: said ONO-type memory cell stack does not include a metal silicide layer" [*Emphasis added*]) that the written description of every patent regarding a method involving a chemical process taking place in a physical environment (that of the claim-defined, "ONO-type memory cell stack") must provide an explicit listing of all things that are excluded during the carrying out of the chemical process. In other words, rather than positively showing what the ONO-type memory cell stack does include as is done in Fig. 3A, the FOA position is that patent law requires Applicant to explicitly list all the things it does not include. No support is provided for such a legal proposition.

Drawings are part of the written description per Cooper Cameron Corp. v. Kvaerner Oilfield Prods., 291 F.3d 1317, 62 USPQ.2d 1846 (Fed. Cir. 2002) {"In *Vas-Cath*, we held that "under proper circumstances, drawings alone may provide a 'written description' of an invention as required by § 112." 935 F.2d at 1565, 19 USPQ2d at 1118. Drawings constitute an adequate description if they describe what is claimed and convey to those of skill in the art that the patentee actually invented what is claimed."}.

The FOA position is that; if an exclusionary list is not provided, Applicant is precluded from noting in the claim that the illustrated ONO-type memory cell stack does not include a metal silicide layer even though it is an indisputable fact that the illustrated ONO-type memory cell stack in Fig. 3A does not include a metal silicide layer and a person of ordinary skill would see this to be the fact.

Moreover, the FOA appears to take the position that an understanding by those skilled in the art that metal silicide should not be present when hydrogen is being used in the flow gas (as is established by the Rule 132 Declaration) is insufficient to demonstrate that Applicant was in appreciative possession of that understanding as well, this being so even though it is an indisputable fact that the illustrated ONO-type memory cell stack in Fig. 3A does not include a metal silicide layer.

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It is respectfully submitted that the legally unsupported position of the FOA, does make reasonable sense. It is impractical to list for every method, all the things that should *not* be included.

It is well established law that the drawings constitute part of the written description. See again, Cooper Cameron Corporation v. Kvaerner Oilfield Products 291 F.3d 1317, 1323, 62 USPQ2d 1846 (Fed. Cir. 2002). It is an indisputable fact that the illustrated ONO-type memory cell stack in Fig. 3A does not include a metal silicide layer.

Response After Final to Second §112 Rejection

If understood correctly, the FOA takes the position with regard to Claim 26 ("constrained to below a volumetric flow ratio of H_2 to O_2 at which formation of a hydrogen flame due to the presence of H_2 is at least unstable if not that the flame is extinguished or unignited due to insufficient presence of H_2) that the specification as filed fails to provide support for this.

However, it is undisputable that paragraph [0040] of the specification states:

> As used herein, the so-called, thermal oxidation with a wet combination of O_2 and H_2 refers to a process where a supplied stream of H_2 is burned (made to produce an invisible flame) in the presence of flowing O_2 to thereby form high temperature water vapor (H_2O) where the volumetric flow ratio of H_2/O_2 (each in terms of sccm) is in the range of 1.0 to 1.8. It is outside of conventional, mass-production practice to reduce the H_2/O_2 volumetric flow ratio below this range (more specifically, below 0.3) because the flame may become unstable at lower values of the ratio.

What appears to be in dispute though, is how a person of ordinary skill in the art would read this text and what inferences such a person would take away from it. Applicant respectfully submits that a person skilled in the art would understand that if the H_2/O_2 ratio is zero (0), that there can be no flame because there is no hydrogen present to be burned. Applicant respectfully submits that a person skilled in the art would understand that if the H_2/O_2 ratio starts off in the conventional range of 1.0 to 1.8 where the flame has been ignited (the hydrogen fire was started) and the H_2/O_2 ratio is reduced continuously until it is zero (0), there will be a value where the flame starts to become "unstable" and a lower value where the flame finally goes out. The concept of there being a value where the flame is "unstable" is

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clearly presented in specification paragraph [0040] as shown above. The concept that the flame will be extinguished as the H_2/O_2 ratio is reduced continuously until it is zero (0) is inherent and did not have to be spelled out for those skilled in the art. Thus a person skilled in the art will readily understand that Applicant was in appreciative possession of the idea of using a low H_2/O_2 ratio where "formation of a hydrogen flame due to the presence of [the low relative amount of] H_2 is at least unstable if not that the flame is extinguished or unignited due to insufficient presence of H_2". Extinction of the flame is inherent as the H_2/O_2 ratio is reduced below the flame instability and towards being essentially zero (0). The specification clearly mentions being "below" the conventional range.

Response After Final to Third §112 Rejection

If understood correctly, the FOA appears to take the position with regard to Claim 27 ("is constrained to below a volumetric flow ratio of H_2 to O_2 at which stable ignition of a hydrogen flame due to the presence of H_2 is assured on a mass production basis") that the specification as filed fails to provide support for this. However, it is undisputable that paragraph [0040] of the specification states (repeating from the above with emphasis added): "It is outside of conventional, mass-production practice to reduce the H_2/O_2 volumetric flow ratio below this range (more specifically, below 0.3) because the flame may become unstable at lower values of the ratio". It is respectfully submitted that this passage provides adequate support for Claim 27.

It is respectfully submitted that, when the totality of weights of "evidence" are placed on the opposing scales of justice in his case (as they should be) and reconsidered with regard to teachings and motivations, the preponderance of evidence clearly tips in favor of a finding nonobviousness and patentability.

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CONCLUSION

In light of the foregoing, Applicant once again respectfully requests that the outstanding grounds of rejection be reversed and the claims be reconsidered in light of the evidence on record and allowed.

The Director is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-2257 for any matter in connection with this response, including any fee for extension of time and/or fee for additional filings (e.g. of Appeal Brief) for additional claims, which may be required for maintaining pendancy of the application and/or of the appeal.

CERTIFICATE OF EFS-WEB TRANSMISSION

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Respectfully submitted,

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(viii) Claims appendix.

An appendix containing a copy of the claims involved in the appeal.

(Claims 1-15, 21-23, 24-28):

Claim 1 (*Previously Presented*): A method of forming sidewall dielectric on an ONO-type memory cell stack where at least one sidewall of the ONO-type memory cell stack includes at least three exposed material layers with at least two of the exposed material layers being respectively composed of an oxide and an oxidizable material disposed adjacent to the oxide, the method comprising:

(a) subjecting the at least one sidewall to a dry ISSG process (In-Situ Steam Generation) where the dry ISSG process comprises:

(a.1) flowing molecular oxygen (O_2) towards the stack; and

(a.2) flowing molecular hydrogen (H_2) towards the stack, where the volumetric flow ratio of the H_2 to the O_2 is less than about 0.2.

Claim 2 (*Original*): The sidewall dielectric forming method of Claim 1 wherein:

(a.2a) said volumetric flow ratio of H_2/O_2 is less than about 0.1.

Claim 3 (*Original*): The sidewall dielectric forming method of Claim 1 wherein:

(a.2a) said volumetric flow ratio of H_2/O_2 is equal to, or less than, about 0.02.

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Claim 4 (*Previously Presented*): The sidewall dielectric forming method of Claim 3 and further comprising:

(b) rapidly heating the flowing oxygen (O_2) and flowing hydrogen (H_2) to a temperature in the range of about 850°C to about 1050°C as they flow towards said at least one sidewall.

Claim 5 (*Previously Presented*): The sidewall dielectric forming method of Claim 3 and further comprising:

(b) continuing the subjecting of the at least one sidewall to the dry ISSG process for a duration selected from the range of about 20 seconds to about 300 seconds.

Claim 6 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 and further comprising:

(a.1a) varying the O_2 flow rate over the range of about 3slm to about 10slm (ten standard liters per minute).

Claim 7 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 and further comprising:

(a.2a) varying the H_2 flow rate over the range of about 0.1slm to about 1slm.

Claim 8 (*Previously Presented*): The sidewall dielectric forming method of Claim 3 and further comprising:

(b) establishing a chamber pressure for the flowing oxygen (O_2) and flowing hydrogen (H_2) in the range of about 5 Torr to about 50 Torr.

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Claim 9 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 and further wherein:

(b) said at least three exposed material layers of the ONO-type memory cell stack includes:

(b.1) a first silicon nitride layer;

(b.2) a first silicon layer; and

(b.3) a first silicon oxide layer adjacent to the first silicon layer.

Claim 10 (*Previously Presented*): The sidewall dielectric forming method of Claim 9 and further wherein said at least three exposed material layers of the ONO-type memory cell stack includes:

(b.4) a second silicon layer;

(b.5) a second silicon oxide layer;

(b.6) a tunnel dielectric layer;

(b.7) wherein the first silicon nitride layer is interposed between the first and second silicon oxide layers; and

(b.8) wherein the combination of the first and second silicon oxide layers and the first silicon nitride layer is interposed between the first and second silicon layers.

Claim 11 (*Previously Presented*): The sidewall dielectric forming method of Claim 10 and further wherein said at least three exposed material layers of the ONO-type memory cell stack includes:

(b.9) a second silicon nitride layer; disposed above the first silicon layer; and further wherein:

said ONO-type memory cell stack does not include a metal silicide layer.

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Claim 12 (*Previously Presented*): The sidewall dielectric forming method of Claim 3 and further wherein:

a height variation ratio, $R_H = H_{outer}/H_{inner}$, determined for the ONO-type memory cell stack after formation of the sidewall dielectric by the dry ISSG process, is about 1.20 or less, where H_{inner} represents a stack height at a lateral position in the stack that is spaced away from the stack edges and where H_{outer} represents a stack height at a lateral position near or at one of the stack edges.

Claim 13 (*Previously Presented*): The sidewall dielectric forming method of Claim 10 and further wherein lateral sidewall breakdown voltages are substantially uniform along the height of the ONO-type memory cell stack after formation of the sidewall dielectric by the dry ISSG process.

Claim 14 (*Previously Presented*): The sidewall dielectric forming method of Claim 10 and further wherein a larger erase speed is obtained in a memory cell having said ONO-type memory cell stack after formation of the sidewall dielectric by the dry ISSG process, where the larger erase speed is larger than a corresponding erase speed obtained in a corresponding memory cell having an ONO-type memory cell stack with sidewall dielectric formed by a dichlorosilane-based HTO process.

Claim 15 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 and further comprising:

(b) after said dry ISSG process, forming further and supplemental sidewall dielectric by a non-ISSG oxidation process.

Claims 16-20: (*Canceled*).

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Claim 21 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 and further comprising:

(a.1a) setting the O_2 flow rate over the range of about 3slm to about 10slm (ten standard liters per minute).

Claim 22 (*Previously Presented*): The sidewall dielectric forming method of Claim 21 and further comprising:

(a.2a) setting the H_2 flow rate over the range of about 0.1slm to about 1slm.

Claim 23 (*Previously Presented*): A method of forming sidewall dielectric on an ONO-type memory cell stack where at least one sidewall of the ONO-type memory cell stack includes at least three exposed material layers with at least two of the exposed material layers being respectively composed of an oxide and an oxidizable material disposed adjacent to the oxide, the method comprising:

(a) subjecting the at least three exposed material layers of the sidewall of the ONO-type memory cell stack to a dry ISSG process (In-Situ Steam Generation) where the dry ISSG process generates short lived oxygen radicals whose reactivity extinguishes before the short lived oxygen radicals are able to permeate laterally as deep into said exposed oxide material of the ONO-type memory cell stack and oxidize materials therein as would the reactive oxygen of a dichlorosilane-based High Temperature Oxidation (HTO) process applied to an essentially same ONO-type memory cell stack.

Claim 24 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 wherein method is part of mass production process that mass produces integrated circuits to have consistent, predefined performance characteristics.

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Claim 25 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 wherein said oxidizable material has a sacrificial nitride layer disposed thereon and the method further comprises:

(b) stripping off the sacrificial nitride layer after performance of said step (a) of subjecting the at least one sidewall to the dry ISSG process.

Claim 26 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 wherein said step (a.2) of flowing the molecular hydrogen (H_2) towards the stack is constrained to below a volumetric flow ratio of H_2 to O_2 at which formation of a hydrogen flame due to the presence of H_2 is at least unstable if not that the flame is extinguished or unignited due to insufficient presence of H_2.

Claim 27 (*Previously Presented*): The sidewall dielectric forming method of Claim 1 wherein said step (a.2) of flowing the molecular hydrogen (H_2) towards the stack is constrained to below a volumetric flow ratio of H_2 to O_2 at which stable ignition of a hydrogen flame due to the presence of H_2 is assured on a mass production basis.

Claim 28 (*Previously Presented*): The sidewall dielectric forming method of Claim 15 wherein said non-ISSG oxidation process includes use of dichlorosilane.

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(ix) Evidence Appendix

An appendix containing copies of any evidence submitted pursuant to §§ 1.130, 1.131, or 1.132 of this title or of any other evidence entered by the examiner and relied upon by appellant in the appeal, along with a statement setting forth where in the record that evidence was entered in the record by the examiner. Reference to unentered evidence is not permitted in the brief. See § 41.33 for treatment of evidence submitted after appeal. This appendix may also include copies of the evidence relied upon by the examiner as to grounds of rejection to be reviewed on appeal.

9.1: Declaration of Chiliang (Larry) Chen Traversing Grounds of Rejection Pursuant to 37 C.F.R. §1.132

This evidence (copy attached) submitted pursuant to §1.132 was filed in Nov. 2006 and accepted as part of the record by the examiner in the Office action of 1/26/2007 at page 6 paragraph 6 thereof.

9.2 A copy (attached) of You 6,706,613

9.3 A copy (attached) of Wang 2005/0110102

(x) Related proceedings (NONE) appendix. An appendix containing copies of decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of this section.

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